

Arsenic Removal Using Amended Silicates™: Opportunities Beyond the US

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Background: In January 2006, the US maximum contaminant level for arsenic was lowered from 0.05 to 0.01 mg/L. In the preceding years, ADA Technologies, under funding from the National Institute for Environmental Health Sciences (NIEHS) and others, developed a novel adsorbent for the capture of arsenic and heavy metals.

The material's physical properties differ from typical adsorbents, complicating its commercial use in the domestic market; however, these same attributes make it attractive for use in the developing world, where millions of people, most notably in Bangladesh, India, and Nepal, are drinking water containing dangerous levels of arsenic.

Methods: Amended Silicates™ adsorbents feature a low-cost substrate impregnated with nano-scale crystallites of akaganeite—a form of iron oxide. The silicate substrate allows the adsorbent to be made easily and produces a low bulk-density adsorbent that can be used in either a packed bed or mixed into water as loose, fluidized granules.

Results: The adsorbent has been extensively tested under laboratory and field conditions and offers several advantages: (1) simple manufacture and low cost (\$0.8 to \$2 per pound); (2) high arsenic capacity; (3) rapid adsorption kinetics; (4) excellent performance in the presence of common water ions; (5) capture of As(III) and As(V) species; (6) ability to chemically bind arsenic: the sorbent reacts with the arsenic to produce a leach-resistant waste; (7) capture of other water contaminants, such as selenium, lead, and uranium; and (8) ability to use as a fluidized media or a plug-resistant packed bed.

Conclusions: The novel physical properties of the Amended Silicate™ adsorbent allow the material to be produced and used with a minimum of equipment or training. These attributes are an appealing combination in developing countries with severe groundwater arsenic contamination.

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